



## High Nitrate in Groundwater?

**Stop Fertilizing—  
But Let the Cows Graze!**

**F**armers who find excessive levels of nitrates in groundwater can keep on grazing their cattle without fear of further contamination from the nitrogen in cattle waste—as long as they reduce or eliminate nitrogen fertilizer use for at least a few years.

That particular wisdom comes from a study at the ARS North Appalachian Experimental Watershed Laboratory in Coshocton, Ohio. For several years, Lloyd Owens, a soil scientist at Coshocton, used a herd of 30 beef cows to rotationally graze four 8-acre fields on a hillside. Owens sampled nitrate levels in the groundwater below each field. U.S. Environmental Protection Agency guidelines for human drinking water stipulate 10 parts per million (ppm) as the maximum allowable safe level for nitrate-nitrogen. There is no danger to cattle from grazing on pastures with high nitrate levels.

Scientists have gathered data on the watersheds in this rolling countryside for more than 60 years. The fields had been used as pasture for about 30 of those years. During the 11 years before the latest study began, Owens tested heavy nitrogen fertilization—150 pounds per acre each year—to see whether it would produce more and better grass for the cattle to graze without doing environmental harm. Unfortunately, it caused too much nitrogen to leach into the groundwater under these experimental pastures. Levels reached 13 to 26 ppm.

Some fields are more likely to have high nitrate levels in the groundwater beneath them, and annual fertilization can

eventually turn them into problem fields. So Owens began a study to see whether he could lower nitrate levels by eliminating fertilizer for 7 years and either grazing cattle or harvesting hay from the fields.

He compared two pastures where cattle were allowed to graze with two pastures that were fenced to keep the animals out. In the “no cattle” pastures, the grass was cut and baled for hay twice a year.

“When you harvest the hay, you remove some nitrogen from the soil,” Owens says. “And when cattle graze, they remove some of the nitrogen.”

Owens found that the nitrate-nitrogen in groundwater was brought down to about the same level (2 to 4 ppm) under both management practices, and the lack of fertilizer caused only a slight decrease in grass growth. But, most importantly, it didn’t make any difference whether cattle were on the land or not.

“It’s a nice finding, because it doesn’t force farmers to remove cattle from problem fields, as long as they stop fertilizing. And it saves the time and labor of baling hay for feed,” Owens says.—By **Don Comis**, ARS.

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